SEQUENCE LISTING

<110> Hruska, Keith A.
McCartney, John E.
Charette, Marc F.

<120> CONJOINT ADMINISTRATION OF MORPHOGENS AND ACE INHIBITORS IN TREATMENT OF CHRONIC RENAL FAILURE

<130> JJJ-P01-599

<140> 10/650,326
<141> 2003-08-28

<150> 60/406,431
<151> 2002-08-28

<160> 31

<170> PatentIn version 3.2

<210> 1
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<212> PRT
<213> Homo sapiens

<400> 1

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1               5                   10                  15

Asn Gln Glu Ala Leu Arg Met Ala Asn Val Ala Glu Asn Ser Ser Ser
            20                  25                  30

Asp Gln Arg Gln Ala Cys Lys Lys His Glu Leu Tyr Val Ser Phe Arg
        35                  40                  45

Asp Leu Gly Trp Gln Asp Trp Ile Ile Ala Pro Glu Gly Tyr Ala Ala
    50                  55                  60

Tyr Tyr Cys Glu Gly Glu Cys Ala Phe Pro Leu Asn Ser Tyr Met Asn
65                  70                  75                  80

Ala Thr Asn His Ala Ile Val Gln Thr Leu Val His Phe Ile Asn Pro
                85                  90                  95

Glu Thr Val Pro Lys Pro Cys Cys Ala Pro Thr Gln Leu Asn Ala Ile
            100                 105                 110

Ser Val Leu Tyr Phe Asp Asp Ser Ser Asn Val Ile Leu Lys Lys Tyr
        115                 120                 125
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Arg Asn Met Val Val Arg Ala Cys Gly Cys His
    130                 135


<210>  2
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<212>  PRT
<213>  Homo sapiens

<400>  2

His Arg Arg Leu Arg Ser Gln Glu Arg Arg Glu Met Gln Arg Glu Ile
1               5                   10                  15


Leu Ser Ile Leu Gly Leu Pro His Arg Pro Arg Pro His Leu Gln Gly
            20                  25                  30


Lys His Asn Ser Ala Pro Met Phe Met Leu Asp Leu Tyr Asn Ala Met
        35                  40                  45


Ala Val Glu Glu Gly Gly Gly Pro Gly Gly Gln Gly Phe Ser Tyr Pro
    50                  55                  60


Tyr Lys Ala Val Phe Ser Thr Gln Gly Pro Pro Leu Ala Ser Leu Gln
65                  70                  75                  80


Asp Ser His Phe Leu Thr Asp Ala Asp Met Val Met Ser Phe Val Asn
                85                  90                  95


Leu


<210>  3
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<212>  PRT
<213>  Homo sapiens

<400>  3

Met His Val Arg Ser Leu Arg Ala Ala Ala Pro His Ser Phe Val Ala
1               5                   10                  15


Leu Trp Ala Pro Leu Phe Leu Leu Arg Ser Ala Leu Ala Asp Phe Ser
            20                  25                  30


Leu Asp Asn Glu Val His Ser Ser Phe Ile His Arg Arg Leu Arg Ser
        35                  40                  45
```

```
Gln Glu Arg Arg Glu Met Gln Arg Glu Ile Leu Ser Ile Leu Gly Leu
    50                  55                  60

Pro His Arg Pro Arg Pro His Leu Gln Gly Lys His Asn Ser Ala Pro
65                  70                  75                  80

Met Phe Met Leu Asp Leu Tyr Asn Ala Met Ala Val Glu Glu Gly Gly
                85                  90                  95

Gly Pro Gly Gly Gln Gly Phe Ser Tyr Pro Tyr Lys Ala Val Phe Ser
            100                 105                 110

Thr Gln Gly Pro Pro Leu Ala Ser Leu Gln Asp Ser His Phe Leu Thr
        115                 120                 125

Asp Ala Asp Met Val Met Ser Phe Val Asn Leu Val Glu His Asp Lys
    130                 135                 140

Glu Phe Phe His Pro Arg Tyr His His Arg Glu Phe Arg Phe Asp Leu
145                 150                 155                 160

Ser Lys Ile Pro Glu Gly Glu Ala Val Thr Ala Ala Glu Phe Arg Ile
                165                 170                 175

Tyr Lys Asp Tyr Ile Arg Glu Arg Phe Asp Asn Glu Thr Phe Arg Ile
            180                 185                 190

Ser Val Tyr Gln Val Leu Gln Glu His Leu Gly Arg Glu Ser Asp Leu
        195                 200                 205

Phe Leu Leu Asp Ser Arg Thr Leu Trp Ala Ser Glu Glu Gly Trp Leu
    210                 215                 220

Val Phe Asp Ile Thr Ala Thr Ser Asn His Trp Val Val Asn Pro Arg
225                 230                 235                 240

His Asn Leu Gly Leu Gln Leu Ser Val Glu Thr Leu Asp Gly Gln Ser
                245                 250                 255

Ile Asn Pro Lys Leu Ala Gly Leu Ile Gly Arg His Gly Pro Gln Asn
            260                 265                 270

Lys Gln Pro Phe Met Val Ala Phe Phe Lys Ala Thr Glu Val His Phe
        275                 280                 285
```

```
Arg Ser Ile Arg Ser Thr Gly Ser Lys Gln Arg Ser Gln Asn Arg Ser
    290                 295                 300

Lys Thr Pro Lys Asn Gln Glu Ala Leu Arg Met Ala Asn Val Ala Glu
305                 310                 315                 320

Asn Ser Ser Ser Asp Gln Arg Gln Ala Cys Lys Lys His Glu Leu Tyr
                325                 330                 335

Val Ser Phe Arg Asp Leu Gly Trp Gln Asp Trp Ile Ile Ala Pro Glu
            340                 345                 350

Gly Tyr Ala Ala Tyr Tyr Cys Glu Gly Glu Cys Ala Phe Pro Leu Asn
        355                 360                 365

Ser Tyr Met Asn Ala Thr Asn His Ala Ile Val Gln Thr Leu Val His
    370                 375                 380

Phe Ile Asn Pro Glu Thr Val Pro Lys Pro Cys Cys Ala Pro Thr Gln
385                 390                 395                 400

Leu Asn Ala Ile Ser Val Leu Tyr Phe Asp Asp Ser Ser Asn Val Ile
                405                 410                 415

Leu Lys Lys Tyr Arg Asn Met Val Val Arg Ala Cys Gly Cys His
            420                 425                 430
```

<210> 4
<211> 139
<212> PRT
<213> Mus musculus

<400> 4

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Ser Thr Gly Gly Lys Gln Arg Ser Gln Asn Arg Ser Lys Thr Pro Lys
1               5                   10                  15

Asn Gln Glu Ala Leu Arg Met Ala Ser Val Ala Glu Asn Ser Ser Ser
            20                  25                  30

Asp Gln Arg Gln Ala Cys Lys Lys His Glu Leu Tyr Val Ser Phe Arg
        35                  40                  45

Asp Leu Gly Trp Gln Asp Trp Ile Ile Ala Pro Glu Gly Tyr Ala Ala
    50                  55                  60
```

```
Tyr Tyr Cys Glu Gly Glu Cys Ala Phe Pro Leu Asn Ser Tyr Met Asn
65                  70                  75                  80

Ala Thr Asn His Ala Ile Val Gln Thr Leu Val His Phe Ile Asn Pro
                85                  90                  95

Asp Thr Val Pro Lys Pro Cys Cys Ala Pro Thr Gln Leu Asn Ala Ile
            100                 105                 110

Ser Val Leu Tyr Phe Asp Asp Ser Ser Asn Val Ile Leu Lys Lys Tyr
        115                 120                 125

Arg Asn Met Val Val Arg Ala Cys Gly Cys His
    130                 135
```

<210> 5
<211> 139
<212> PRT
<213> Homo sapiens

<400> 5

```
Ala Val Arg Pro Leu Arg Arg Arg Gln Pro Lys Lys Ser Asn Glu Leu
1               5                   10                  15

Pro Gln Ala Asn Arg Leu Pro Gly Ile Phe Asp Asp Val His Gly Ser
            20                  25                  30

His Gly Arg Gln Val Cys Arg Arg His Glu Leu Tyr Val Ser Phe Gln
        35                  40                  45

Asp Leu Gly Trp Leu Asp Trp Val Ile Ala Pro Gln Gly Tyr Ser Ala
    50                  55                  60

Tyr Tyr Cys Glu Gly Glu Cys Ser Phe Pro Leu Asp Ser Cys Met Asn
65                  70                  75                  80

Ala Thr Asn His Ala Ile Leu Gln Ser Leu Val His Leu Met Lys Pro
                85                  90                  95

Asn Ala Val Pro Lys Ala Cys Cys Ala Pro Thr Lys Leu Ser Ala Thr
            100                 105                 110

Ser Val Leu Tyr Tyr Asp Ser Ser Asn Asn Val Ile Leu Arg Lys His
        115                 120                 125
```

Arg Asn Met Val Val Lys Ala Cys Gly Cys His
130 135

<210> 6
<211> 139
<212> PRT
<213> Mus musculus

<400> 6

Ala Ala Arg Pro Leu Lys Arg Arg Gln Pro Lys Lys Thr Asn Glu Leu
1 5 10 15

Pro His Pro Asn Lys Leu Pro Gly Ile Phe Asp Asp Gly His Gly Ser
20 25 30

Arg Gly Arg Glu Val Cys Arg Arg His Glu Leu Tyr Val Ser Phe Arg
35 40 45

Asp Leu Gly Trp Leu Asp Trp Val Ile Ala Pro Gln Gly Tyr Ser Ala
50 55 60

Tyr Tyr Cys Glu Gly Glu Cys Ala Phe Pro Leu Asp Ser Cys Met Asn
65 70 75 80

Ala Thr Asn His Ala Ile Leu Gln Ser Leu Val His Leu Met Lys Pro
85 90 95

Asp Val Val Pro Lys Ala Cys Cys Ala Pro Thr Lys Leu Ser Ala Thr
100 105 110

Ser Val Leu Tyr Tyr Asp Ser Ser Asn Asn Val Ile Leu Arg Lys His
115 120 125

Arg Asn Met Val Val Lys Ala Cys Gly Cys His
130 135

<210> 7
<211> 588
<212> PRT
<213> Drosophila melanogaster

<400> 7

Met Arg Ala Trp Leu Leu Leu Leu Ala Val Leu Ala Thr Phe Gln Thr
1 5 10 15

```
Ile Val Arg Val Ala Ser Thr Glu Asp Ile Ser Gln Arg Phe Ile Ala
            20                  25                  30

Ala Ile Ala Pro Val Ala Ala His Ile Pro Leu Ala Ser Ala Ser Gly
        35                  40                  45

Ser Gly Ser Gly Arg Ser Gly Ser Arg Ser Gly Gly Ala Ser Thr Ser
    50                  55                  60

Thr Ala Leu Ala Lys Ala Phe Asn Pro Phe Ser Glu Pro Ala Ser Phe
65                  70                  75                  80

Ser Asp Ser Asp Lys Ser His Arg Ser Lys Thr Asn Lys Lys Pro Ser
                85                  90                  95

Lys Ser Asp Ala Asn Arg Gln Phe Asn Glu Val His Lys Pro Arg Thr
            100                 105                 110

Asp Gln Leu Glu Asn Ser Lys Asn Met Ser Lys Gln Leu Val Asn Lys
        115                 120                 125

Pro Asn His Asn Lys Met Ala Val Lys Glu Gln Arg Ser His His Lys
    130                 135                 140

Lys Ser His His His Arg Ser His Gln Pro Lys Gln Ala Ser Ala Ser
145                 150                 155                 160

Thr Glu Ser His Gln Ser Ser Ser Ile Glu Ser Ile Phe Val Glu Glu
                165                 170                 175

Pro Thr Leu Val Leu Asp Arg Glu Val Ala Ser Ile Asn Val Pro Ala
            180                 185                 190

Asn Ala Lys Ala Ile Ile Ala Glu Gln Gly Pro Ser Thr Tyr Ser Lys
        195                 200                 205

Glu Ala Leu Ile Lys Asp Lys Leu Lys Pro Asp Pro Ser Thr Leu Val
    210                 215                 220

Glu Ile Glu Lys Ser Leu Leu Ser Leu Phe Asn Met Lys Arg Pro Pro
225                 230                 235                 240

Lys Ile Asp Arg Ser Lys Ile Ile Ile Pro Glu Pro Met Lys Lys Leu
                245                 250                 255
```

```
Tyr Ala Glu Ile Met Gly His Glu Leu Asp Ser Val Asn Ile Pro Lys
            260                 265                 270

Pro Gly Leu Leu Thr Lys Ser Ala Asn Thr Val Arg Ser Phe Thr His
        275                 280                 285

Lys Asp Ser Lys Ile Asp Asp Arg Phe Pro His His His Arg Phe Arg
    290                 295                 300

Leu His Phe Asp Val Lys Ser Ile Pro Ala Asp Glu Lys Leu Lys Ala
305                 310                 315                 320

Ala Glu Leu Gln Leu Thr Arg Asp Ala Leu Ser Gln Gln Val Val Ala
                325                 330                 335

Ser Arg Ser Ser Ala Asn Arg Thr Arg Tyr Gln Val Leu Val Tyr Asp
            340                 345                 350

Ile Thr Arg Val Gly Val Arg Gly Gln Arg Glu Pro Ser Tyr Leu Leu
        355                 360                 365

Leu Asp Thr Lys Thr Val Arg Leu Asn Ser Thr Asp Thr Val Ser Leu
    370                 375                 380

Asp Val Gln Pro Ala Val Asp Arg Trp Leu Ala Ser Pro Gln Arg Asn
385                 390                 395                 400

Tyr Gly Leu Leu Val Glu Val Arg Thr Val Arg Ser Leu Lys Pro Ala
                405                 410                 415

Pro His His His Val Arg Leu Arg Arg Ser Ala Asp Glu Ala His Glu
            420                 425                 430

Arg Trp Gln His Lys Gln Pro Leu Leu Phe Thr Tyr Thr Asp Asp Gly
        435                 440                 445

Arg His Lys Ala Arg Ser Ile Arg Asp Val Ser Gly Gly Glu Gly Gly
    450                 455                 460

Gly Lys Gly Gly Arg Asn Lys Arg Gln Pro Arg Arg Pro Thr Arg Arg
465                 470                 475                 480

Lys Asn His Asp Asp Thr Cys Arg Arg His Ser Leu Tyr Val Asp Phe
                485                 490                 495
```

```
Ser Asp Val Gly Trp Asp Asp Trp Ile Val Ala Pro Leu Gly Tyr Asp
            500                 505                 510

Ala Tyr Tyr Cys His Gly Lys Cys Pro Phe Pro Leu Ala Asp His Phe
        515                 520                 525

Asn Ser Thr Asn His Ala Val Val Gln Thr Leu Val Asn Asn Met Asn
    530                 535                 540

Pro Gly Lys Val Pro Lys Ala Cys Cys Val Pro Thr Gln Leu Asp Ser
545                 550                 555                 560

Val Ala Met Leu Tyr Leu Asn Asp Gln Ser Thr Val Val Leu Lys Asn
                565                 570                 575

Tyr Gln Glu Met Thr Val Val Gly Cys Gly Cys Arg
            580                 585
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<210> 8
<211> 360
<212> PRT
<213> Xenopus laevis

<400> 8

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Met Val Trp Leu Arg Leu Trp Ala Phe Leu His Ile Leu Ala Ile Val
1               5                   10                  15

Thr Leu Asp Pro Glu Leu Lys Arg Arg Glu Glu Leu Phe Leu Arg Ser
            20                  25                  30

Leu Gly Phe Ser Ser Lys Pro Asn Pro Val Ser Pro Pro Pro Val Pro
        35                  40                  45

Ser Ile Leu Trp Arg Ile Phe Asn Gln Arg Met Gly Ser Ser Ile Gln
    50                  55                  60

Lys Lys Lys Pro Asp Leu Cys Phe Val Glu Glu Phe Asn Val Pro Gly
65                  70                  75                  80

Ser Val Ile Arg Val Phe Pro Asp Gln Gly Arg Phe Ile Ile Pro Tyr
                85                  90                  95

Ser Asp Asp Ile His Pro Thr Gln Cys Leu Glu Lys Arg Leu Phe Phe
            100                 105                 110
```

```
Asn Ile Ser Ala Ile Glu Lys Glu Glu Arg Val Thr Met Gly Ser Gly
        115                 120                 125

Ile Glu Val Gln Pro Glu His Leu Leu Arg Lys Gly Ile Asp Leu Arg
    130                 135                 140

Leu Tyr Arg Thr Leu Gln Ile Thr Leu Lys Gly Met Gly Arg Ser Lys
145                 150                 155                 160

Thr Ser Arg Lys Leu Leu Val Ala Gln Thr Phe Arg Leu Leu His Lys
                165                 170                 175

Ser Leu Phe Phe Asn Leu Thr Glu Ile Cys Gln Ser Trp Gln Asp Pro
            180                 185                 190

Leu Lys Asn Leu Gly Leu Val Leu Glu Ile Phe Pro Lys Lys Glu Ser
        195                 200                 205

Ser Trp Met Ser Thr Ala Asn Asp Glu Cys Lys Asp Ile Gln Thr Phe
    210                 215                 220

Leu Tyr Thr Ser Leu Leu Thr Val Thr Leu Asn Pro Leu Arg Cys Lys
225                 230                 235                 240

Arg Pro Arg Arg Lys Arg Ser Tyr Ser Lys Leu Pro Phe Thr Ala Ser
                245                 250                 255

Asn Ile Cys Lys Lys Arg His Leu Tyr Val Glu Phe Lys Asp Val Gly
            260                 265                 270

Trp Gln Asn Trp Val Ile Ala Pro Gln Gly Tyr Met Ala Asn Tyr Cys
        275                 280                 285

Tyr Gly Glu Cys Pro Tyr Pro Leu Thr Glu Ile Leu Asn Gly Ser Asn
    290                 295                 300

His Ala Ile Leu Gln Thr Leu Val His Ser Ile Glu Pro Glu Asp Ile
305                 310                 315                 320

Pro Leu Pro Cys Cys Val Pro Thr Lys Met Ser Pro Ile Ser Met Leu
                325                 330                 335

Phe Tyr Asp Asn Asn Asp Asn Val Val Leu Arg His Tyr Glu Asn Met
            340                 345                 350
```

Ala Val Asp Glu Cys Gly Cys Arg
355 360

<210> 9
<211> 438
<212> PRT
<213> Mus musculus

<400> 9

Met Arg Lys Met Gln Lys Glu Ile Leu Ser Val Leu Gly Pro Pro His
1 5 10 15

Arg Pro Arg Pro Leu His Gly Leu Gln Gln Pro Gln Pro Pro Val Leu
20 25 30

Pro Pro Gln Gln Gln Gln Gln Gln Gln Gln Gln Thr Ala Arg Glu
35 40 45

Glu Pro Pro Pro Gly Arg Leu Lys Ser Ala Pro Leu Phe Met Leu Asp
50 55 60

Leu Tyr Asn Ala Leu Ser Asn Asp Asp Glu Glu Asp Gly Ala Ser Glu
65 70 75 80

Gly Val Gly Gln Glu Pro Gly Ser His Gly Gly Ala Ser Ser Ser Gln
85 90 95

Leu Arg Gln Pro Ser Pro Gly Ala Ala His Ser Leu Asn Arg Lys Ser
100 105 110

Leu Leu Ala Pro Gly Pro Gly Gly Gly Ala Ser Pro Leu Thr Ser Ala
115 120 125

Gln Asp Ser Ala Phe Leu Asn Asp Ala Asp Met Val Met Ser Phe Val
130 135 140

Asn Leu Val Glu Tyr Asp Lys Glu Phe Ser Pro His Gln Arg His His
145 150 155 160

Lys Glu Phe Lys Phe Asn Leu Ser Gln Ile Pro Glu Gly Glu Ala Val
165 170 175

Thr Ala Ala Glu Phe Arg Val Tyr Lys Asp Cys Val Val Gly Ser Phe
180 185 190

```
Lys Asn Gln Thr Phe Leu Ile Ser Ile Tyr Gln Val Leu Gln Glu His
        195                 200                 205

Gln His Arg Asp Ser Asp Leu Phe Leu Leu Asp Thr Arg Val Val Trp
    210                 215                 220

Ala Ser Glu Glu Gly Trp Leu Glu Phe Asp Ile Thr Ala Thr Ser Asn
225                 230                 235                 240

Leu Trp Val Val Thr Pro Gln His Asn Met Gly Leu Gln Leu Ser Val
                245                 250                 255

Val Thr Arg Asp Gly Leu His Val Asn Pro Arg Ala Ala Gly Leu Val
            260                 265                 270

Gly Arg Asp Gly Pro Tyr Asp Lys Gln Pro Phe Met Val Ala Phe Phe
        275                 280                 285

Lys Val Ser Glu Val His Val Arg Thr Thr Arg Ser Ala Ser Ser Arg
    290                 295                 300

Arg Arg Gln Gln Ser Arg Asn Arg Ser Thr Gln Ser Gln Asp Val Ser
305                 310                 315                 320

Arg Gly Ser Gly Ser Ser Asp Tyr Asn Gly Ser Glu Leu Lys Thr Ala
                325                 330                 335

Cys Lys Lys His Glu Leu Tyr Val Ser Phe Gln Asp Leu Gly Trp Gln
            340                 345                 350

Asp Trp Ile Ile Ala Pro Lys Gly Tyr Ala Ala Asn Tyr Cys Asp Gly
        355                 360                 365

Glu Cys Ser Phe Pro Leu Asn Ala His Met Asn Ala Thr Asn His Ala
    370                 375                 380

Ile Val Gln Thr Leu Val His Leu Met Asn Pro Glu Tyr Val Pro Lys
385                 390                 395                 400

Pro Cys Cys Ala Pro Thr Lys Leu Asn Ala Ile Ser Val Leu Tyr Phe
                405                 410                 415

Asp Asp Asn Ser Asn Val Ile Leu Lys Lys Tyr Arg Asn Met Val Val
            420                 425                 430
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Arg Ala Cys Gly Cys His
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<211> 1547
<212> DNA
<213> Homo sapiens

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tgcccgacac tgagacgctg ttcccagcgt gaaaagagag actgcgcggc cggcacccgg 180

gagaaggagg aggcaaagaa aaggaacgga cattcggtcc ttgcgccagg tcctttgacc 240

agagtttttc catgtggacg ctctttcaat ggacgtgtcc ccgcgtgctt cttagacgga 300

ctgcggtctc ctaaaggtcg accatggtgg ccgggacccg ctgtcttcta gcgttgctgc 360

ttccccaggt cctcctgggc ggcgcggctg gcctcgttcc ggagctgggc cgcaggaagt 420

tcgcggcggc gtcgtcgggc cgcccctcat cccagccctc tgacgaggtc ctgagcgagt 480

tcgagttgcg gctgctcagc atgttcggcc tgaaacagag acccaccccc agcagggacg 540

ccgtggtgcc cccctacatg ctagacctgt atcgcaggca ctcaggtcag ccgggctcac 600

ccgccccaga ccaccggttg gagagggcag ccagccgagc caacactgtg cgcagcttcc 660

accatgaaga atctttggaa gaactaccag aaacgagtgg gaaaacaacc cggagattct 720

tctttaattt aagttctatc cccacggagg agtttatcac ctcagcagag cttcaggttt 780

tccgagaaca gatgcaagat gctttaggaa acaatagcag tttccatcac cgaattaata 840

tttatgaaat cataaaacct gcaacagcca actcgaaatt ccccgtgacc agacttttgg 900

acaccaggtt ggtgaatcag aatgcaagca ggtgggaaag ttttgatgtc acccccgctg 960

tgatgcggtg gactgcacag ggacacgcca accatggatt cgtggtggaa gtggcccact 1020

tggaggagaa acaaggtgtc tccaagagac atgttaggat aagcaggtct ttgcaccaag 1080

atgaacacag ctggtcacag ataaggccat tgctagtaac ttttggccat gatggaaaag 1140

ggcatcctct ccacaaaaga gaaaaacgtc aagccaaaca caaacagcgg aaacgcctta 1200

agtccagctg taagagacac cctttgtacg tggacttcag tgacgtgggg tggaatgact 1260

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tggctgatca tctgaactcc actaatcatg ccattgttca gacgttggtc aactctgtta 1380

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gtgggtgtcg ctagtacagc aaaattaaat acataaatat atatata 1547

<210> 11
<211> 1751
<212> DNA
<213> Homo sapiens

<400> 11
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gcttgtctcc ccgatgggat tcccgtccaa gctatctcga gcctgcagcg ccacagtccc 180

cggccctcgc ccaggttcac tgcaaccgtt cagaggtccc caggagctgc tgctggcgag 240

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gcagcttccc tgagcctttc cagcaagttt gttcaagatt ggctgtcaag aatcatggac 360

tgttattata tgccttgttt tctgtcaaga caccatgatt cctggtaacc gaatgctgat 420

ggtcgtttta ttatgccaag tcctgctagg aggcgcgagc catgctagtt tgatacctga 480

gacggggaag aaaaaagtcg ccgagattca gggccacgcg ggaggacgcc gctcagggca 540

gagccatgag ctcctgcggg acttcgaggc gacacttctg cagatgtttg ggctgcgccg 600

ccgcccgcag cctagcaaga gtgccgtcat tccggactac atgcgggatc tttaccggct 660

tcagtctggg gaggaggagg aagagcagat ccacagcact ggtcttgagt atcctgagcg 720

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gacttttatt t 1751

<210> 12
<211> 472
<212> PRT
<213> Homo sapiens

<400> 12

Met Ala Gly Ala Ser Arg Leu Leu Phe Leu Trp Leu Gly Cys Phe Cys
1 5 10 15

Val Ser Leu Ala Gln Gly Glu Arg Pro Lys Pro Pro Phe Pro Glu Leu
20 25 30

Arg Lys Ala Val Pro Gly Asp Arg Thr Ala Gly Gly Gly Pro Asp Ser
35 40 45

Glu Leu Gln Pro Gln Asp Lys Val Ser Glu His Met Leu Arg Leu Tyr
50 55 60

Asp Arg Tyr Ser Thr Val Gln Ala Ala Arg Thr Pro Gly Ser Leu Glu
65 70 75 80

Gly Gly Ser Gln Pro Trp Arg Pro Arg Leu Leu Arg Glu Gly Asn Thr
85 90 95

Val Arg Ser Phe Arg Ala Ala Ala Ala Glu Thr Leu Glu Arg Lys Gly
100 105 110

Leu Tyr Ile Phe Asn Leu Thr Ser Leu Thr Lys Ser Glu Asn Ile Leu
115 120 125

Ser Ala Thr Leu Tyr Phe Cys Ile Gly Glu Leu Gly Asn Ile Ser Leu
130 135 140

Ser Cys Pro Val Ser Gly Gly Cys Ser His His Ala Gln Arg Lys His
145 150 155 160

```
Ile Gln Ile Asp Leu Ser Ala Trp Thr Leu Lys Phe Ser Arg Asn Gln
                165                 170                 175

Ser Gln Leu Leu Gly His Leu Ser Val Asp Met Ala Lys Ser His Arg
            180                 185                 190

Asp Ile Met Ser Trp Leu Ser Lys Asp Ile Thr Gln Phe Leu Arg Lys
        195                 200                 205

Ala Lys Glu Asn Glu Glu Phe Leu Ile Gly Phe Asn Ile Thr Ser Lys
    210                 215                 220

Gly Arg Gln Leu Pro Lys Arg Arg Leu Pro Phe Pro Glu Pro Tyr Ile
225                 230                 235                 240

Leu Val Tyr Ala Asn Asp Ala Ala Ile Ser Glu Pro Glu Ser Val Val
                245                 250                 255

Ser Ser Leu Gln Gly His Arg Asn Phe Pro Thr Gly Thr Val Pro Lys
            260                 265                 270

Trp Asp Ser His Ile Arg Ala Ala Leu Ser Ile Glu Arg Arg Lys Lys
        275                 280                 285

Arg Ser Thr Gly Val Leu Leu Pro Leu Gln Asn Asn Glu Leu Pro Gly
    290                 295                 300

Ala Glu Tyr Gln Tyr Lys Lys Asp Glu Val Trp Glu Glu Arg Lys Pro
305                 310                 315                 320

Tyr Lys Thr Leu Gln Ala Gln Ala Pro Glu Lys Ser Lys Asn Lys Lys
                325                 330                 335

Lys Gln Arg Lys Gly Pro His Arg Lys Ser Gln Thr Leu Gln Phe Asp
            340                 345                 350

Glu Gln Thr Leu Lys Lys Ala Arg Arg Lys Gln Trp Ile Glu Pro Arg
        355                 360                 365

Asn Cys Ala Arg Arg Tyr Leu Lys Val Asp Phe Ala Asp Ile Gly Trp
    370                 375                 380

Ser Glu Trp Ile Ile Ser Pro Lys Ser Phe Asp Ala Tyr Tyr Cys Ser
385                 390                 395                 400
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```
Gly Ala Cys Gln Phe Pro Met Pro Lys Ser Leu Lys Pro Ser Asn His
                405                 410                 415

Ala Thr Ile Gln Ser Ile Val Arg Ala Val Gly Val Val Pro Gly Ile
            420                 425                 430

Pro Glu Pro Cys Cys Val Pro Glu Lys Met Ser Ser Leu Ser Ile Leu
        435                 440                 445

Phe Phe Asp Glu Asn Lys Asn Val Val Leu Lys Val Tyr Pro Asn Met
    450                 455                 460

Thr Val Glu Ser Cys Ala Cys Arg
465                 470
```

<210> 13
<211> 372
<212> PRT
<213> Homo sapiens

<400> 13

```
Met Pro Pro Pro Gln Gln Gly Pro Cys Gly His His Leu Leu Leu Leu
1               5                   10                  15

Leu Ala Leu Leu Leu Pro Ser Leu Pro Leu Thr Arg Ala Pro Val Pro
            20                  25                  30

Pro Gly Pro Ala Ala Ala Leu Leu Gln Ala Leu Gly Leu Arg Asp Glu
        35                  40                  45

Pro Gln Gly Ala Pro Arg Leu Arg Pro Val Pro Pro Val Met Trp Arg
    50                  55                  60

Leu Phe Arg Arg Arg Asp Pro Gln Glu Thr Arg Ser Gly Ser Arg Arg
65                  70                  75                  80

Thr Ser Pro Gly Val Thr Leu Gln Pro Cys His Val Glu Glu Leu Gly
                85                  90                  95

Val Ala Gly Asn Ile Val Arg His Ile Pro Asp Arg Gly Ala Pro Thr
            100                 105                 110

Arg Ala Ser Glu Pro Val Ser Ala Ala Gly His Cys Pro Glu Trp Thr
        115                 120                 125
```

```
Val Val Phe Asp Leu Ser Ala Val Glu Pro Ala Glu Arg Pro Ser Arg
    130                 135                 140

Ala Arg Leu Glu Leu Arg Phe Ala Ala Ala Ala Ala Ala Ala Pro Glu
145                 150                 155                 160

Gly Gly Trp Glu Leu Ser Val Ala Gln Ala Gly Gln Gly Ala Gly Ala
                165                 170                 175

Asp Pro Gly Pro Val Leu Leu Arg Gln Leu Val Pro Ala Leu Gly Pro
            180                 185                 190

Pro Val Arg Ala Glu Leu Leu Gly Ala Ala Trp Ala Arg Asn Ala Ser
        195                 200                 205

Trp Pro Arg Ser Leu Arg Leu Ala Leu Ala Leu Arg Pro Arg Ala Pro
    210                 215                 220

Ala Ala Cys Ala Arg Leu Ala Glu Ala Ser Leu Leu Leu Val Thr Leu
225                 230                 235                 240

Asp Pro Arg Leu Cys His Pro Leu Ala Arg Pro Arg Arg Asp Ala Glu
                245                 250                 255

Pro Val Leu Gly Gly Gly Pro Gly Gly Ala Cys Arg Ala Arg Arg Leu
            260                 265                 270

Tyr Val Ser Phe Arg Glu Val Gly Trp His Arg Trp Val Ile Ala Pro
        275                 280                 285

Arg Gly Phe Leu Ala Asn Tyr Cys Gln Gly Gln Cys Ala Leu Pro Val
    290                 295                 300

Ala Leu Ser Gly Ser Gly Gly Pro Pro Ala Leu Asn His Ala Val Leu
305                 310                 315                 320

Arg Ala Leu Met His Ala Ala Ala Pro Gly Ala Ala Asp Leu Pro Cys
                325                 330                 335

Cys Val Pro Ala Arg Leu Ser Pro Ile Ser Val Leu Phe Phe Asp Asn
            340                 345                 350

Ser Asp Asn Val Val Leu Arg Gln Tyr Glu Asp Met Val Val Asp Glu
        355                 360                 365
```

Cys Gly Cys Arg
370

<210> 14
<211> 455
<212> PRT
<213> Drosophila melanogaster

<400> 14

Met Ser Gly Leu Arg Asn Thr Ser Glu Ala Val Ala Val Leu Ala Ser
1 5 10 15

Leu Gly Leu Gly Met Val Leu Leu Met Phe Val Ala Thr Thr Pro Pro
20 25 30

Ala Val Glu Ala Thr Gln Ser Gly Ile Tyr Ile Asp Asn Gly Lys Asp
35 40 45

Gln Thr Ile Met His Arg Val Leu Ser Glu Asp Asp Lys Leu Asp Val
50 55 60

Ser Tyr Glu Ile Leu Glu Phe Leu Gly Ile Ala Glu Arg Pro Thr His
65 70 75 80

Leu Ser Ser His Gln Leu Ser Leu Arg Lys Ser Ala Pro Lys Phe Leu
85 90 95

Leu Asp Val Tyr His Arg Ile Thr Ala Glu Glu Gly Leu Ser Asp Gln
100 105 110

Asp Glu Asp Asp Asp Tyr Glu Arg Gly His Arg Ser Arg Arg Ser Ala
115 120 125

Asp Leu Glu Glu Asp Glu Gly Glu Gln Gln Lys Asn Phe Ile Thr Asp
130 135 140

Leu Asp Lys Arg Ala Ile Asp Glu Ser Asp Ile Ile Met Thr Phe Leu
145 150 155 160

Asn Lys Arg His His Asn Val Asp Glu Leu Arg His Glu His Gly Arg
165 170 175

Arg Leu Trp Phe Asp Val Ser Asn Val Pro Asn Asp Asn Tyr Leu Val
180 185 190

```
Met Ala Glu Leu Arg Ile Tyr Gln Asn Ala Asn Glu Gly Lys Trp Leu
        195                 200                 205

Thr Ala Asn Arg Glu Phe Thr Ile Thr Val Tyr Ala Ile Gly Thr Gly
    210                 215                 220

Thr Leu Gly Gln His Thr Met Glu Pro Leu Ser Ser Val Asn Thr Thr
225                 230                 235                 240

Gly Asp Tyr Val Gly Trp Leu Glu Leu Asn Val Thr Glu Gly Leu His
                245                 250                 255

Glu Trp Leu Val Lys Ser Lys Asp Asn His Gly Ile Tyr Ile Gly Ala
            260                 265                 270

His Ala Val Asn Arg Pro Asp Arg Glu Val Lys Leu Asp Asp Ile Gly
        275                 280                 285

Leu Ile His Arg Lys Val Asp Asp Glu Phe Gln Pro Phe Met Ile Gly
    290                 295                 300

Phe Phe Arg Gly Pro Glu Leu Ile Lys Ala Thr Ala His Ser Ser His
305                 310                 315                 320

His Arg Ser Lys Arg Ser Ala Ser His Pro Arg Lys Arg Lys Lys Ser
                325                 330                 335

Val Ser Pro Asn Asn Val Pro Leu Leu Glu Pro Met Glu Ser Thr Arg
            340                 345                 350

Ser Cys Gln Met Gln Thr Leu Tyr Ile Asp Phe Lys Asp Leu Gly Trp
        355                 360                 365

His Asp Trp Ile Ile Ala Pro Glu Gly Tyr Gly Ala Phe Tyr Cys Ser
    370                 375                 380

Gly Glu Cys Asn Phe Pro Leu Asn Ala His Met Asn Ala Thr Asn His
385                 390                 395                 400

Ala Ile Val Gln Thr Leu Val His Leu Leu Glu Pro Lys Lys Val Pro
                405                 410                 415

Lys Pro Cys Cys Ala Pro Thr Arg Leu Gly Ala Leu Pro Val Leu Tyr
            420                 425                 430
```

```
His Leu Asn Asp Glu Asn Val Asn Leu Lys Lys Tyr Arg Asn Met Ile
        435                 440                 445

Val Lys Ser Cys Gly Cys His
    450                 455
```

<210> 15
<211> 454
<212> PRT
<213> Homo sapiens

<400> 15

```
Met His Leu Thr Val Phe Leu Leu Lys Gly Ile Val Gly Phe Leu Trp
1               5                   10                  15

Ser Cys Trp Val Leu Val Gly Tyr Ala Lys Gly Gly Leu Gly Asp Asn
            20                  25                  30

His Val His Ser Ser Phe Ile Tyr Arg Arg Leu Arg Asn His Glu Arg
        35                  40                  45

Arg Glu Ile Gln Arg Glu Ile Leu Ser Ile Leu Gly Leu Pro His Arg
    50                  55                  60

Pro Arg Pro Phe Ser Pro Gly Lys Gln Ala Ser Ser Ala Pro Leu Phe
65                  70                  75                  80

Met Leu Asp Leu Tyr Asn Ala Met Thr Asn Glu Glu Asn Pro Glu Glu
                85                  90                  95

Ser Glu Tyr Ser Val Arg Ala Ser Leu Ala Glu Glu Thr Arg Gly Ala
            100                 105                 110

Arg Lys Gly Tyr Pro Ala Ser Pro Asn Gly Tyr Pro Arg Arg Ile Gln
        115                 120                 125

Leu Ser Arg Thr Thr Pro Leu Thr Thr Gln Ser Pro Pro Leu Ala Ser
    130                 135                 140

Leu His Asp Thr Asn Phe Leu Asn Asp Ala Asp Met Val Met Ser Phe
145                 150                 155                 160

Val Asn Leu Val Glu Arg Asp Lys Asp Phe Ser His Gln Arg Arg His
                165                 170                 175
```

```
Tyr Lys Glu Phe Arg Phe Asp Leu Thr Gln Ile Pro His Gly Glu Ala
            180                 185                 190

Val Thr Ala Ala Glu Phe Arg Ile Tyr Lys Asp Arg Ser Asn Asn Arg
        195                 200                 205

Phe Glu Asn Glu Thr Ile Lys Ile Ser Ile Tyr Gln Ile Ile Lys Glu
    210                 215                 220

Tyr Thr Asn Arg Asp Ala Asp Leu Phe Leu Leu Asp Thr Arg Lys Ala
225                 230                 235                 240

Gln Ala Leu Asp Val Gly Trp Leu Val Phe Asp Ile Thr Val Thr Ser
                245                 250                 255


Asn His Trp Val Ile Asn Pro Gln Asn Asn Leu Gly Leu Gln Leu Cys
            260                 265                 270

Ala Glu Thr Gly Asp Gly Arg Ser Ile Asn Val Lys Ser Ala Gly Leu
        275                 280                 285

Val Gly Arg Gln Gly Pro Gln Ser Lys Gln Pro Phe Met Val Ala Phe
    290                 295                 300

Phe Lys Ala Ser Glu Val Leu Leu Arg Ser Val Arg Ala Ala Asn Lys
305                 310                 315                 320

Arg Lys Asn Gln Asn Arg Asn Lys Ser Ser Ser His Gln Asp Ser Ser
                325                 330                 335

Arg Met Ser Ser Val Gly Asp Tyr Asn Thr Ser Glu Gln Lys Gln Ala
            340                 345                 350

Cys Lys Lys His Glu Leu Tyr Val Ser Phe Arg Asp Leu Gly Trp Gln
        355                 360                 365

Asp Trp Ile Ile Ala Pro Glu Gly Tyr Ala Ala Phe Tyr Cys Asp Gly
    370                 375                 380

Glu Cys Ser Phe Pro Leu Asn Ala His Met Asn Ala Thr Asn His Ala
385                 390                 395                 400

Ile Val Gln Thr Leu Val His Leu Met Phe Pro Asp His Val Pro Lys
                405                 410                 415
```

```
Pro Cys Cys Ala Pro Thr Lys Leu Asn Ala Ile Ser Val Leu Tyr Phe
            420                 425                 430

Asp Asp Ser Ser Asn Val Ile Leu Lys Lys Tyr Arg Asn Met Val Val
        435                 440                 445

Arg Ser Cys Gly Cys His
    450
```

<210> 16
<211> 513
<212> PRT
<213> Homo sapiens

<400> 16

```
Met Pro Gly Leu Gly Arg Arg Ala Gln Trp Leu Cys Trp Trp Trp Gly
1               5                   10                  15

Leu Leu Cys Ser Cys Cys Gly Pro Pro Pro Leu Arg Pro Pro Leu Pro
            20                  25                  30

Ala Ala Ala Ala Ala Ala Ala Gly Gly Gln Leu Leu Gly Asp Gly Gly
        35                  40                  45

Ser Pro Gly Arg Thr Glu Gln Pro Pro Pro Ser Pro Gln Ser Ser Ser
    50                  55                  60

Gly Phe Leu Tyr Arg Arg Leu Lys Thr Gln Glu Lys Arg Glu Met Gln
65                  70                  75                  80

Lys Glu Ile Leu Ser Val Leu Gly Leu Pro His Arg Pro Arg Pro Leu
                85                  90                  95

His Gly Leu Gln Gln Pro Gln Pro Pro Ala Leu Arg Gln Gln Glu Glu
            100                 105                 110

Gln Gln Gln Gln Gln Gln Leu Pro Arg Gly Glu Pro Pro Pro Gly Arg
        115                 120                 125

Leu Lys Ser Ala Pro Leu Phe Met Leu Asp Leu Tyr Asn Ala Leu Ser
    130                 135                 140

Ala Asp Asn Asp Glu Asp Gly Ala Ser Glu Gly Glu Arg Gln Gln Ser
145                 150                 155                 160
```

```
Trp Pro His Glu Ala Ala Ser Ser Ser Gln Arg Arg Gln Pro Pro Pro
                165                 170                 175

Gly Ala Ala His Pro Leu Asn Arg Lys Ser Leu Leu Ala Pro Gly Ser
            180                 185                 190

Gly Ser Gly Gly Ala Ser Pro Leu Thr Ser Ala Gln Asp Ser Ala Phe
        195                 200                 205

Leu Asn Asp Ala Asp Met Val Met Ser Phe Val Asn Leu Val Glu Tyr
    210                 215                 220

Asp Lys Glu Phe Ser Pro Arg Gln Arg His His Lys Glu Phe Lys Phe
225                 230                 235                 240

Asn Leu Ser Gln Ile Pro Glu Gly Glu Val Val Thr Ala Ala Glu Phe
                245                 250                 255

Arg Ile Tyr Lys Asp Cys Val Met Gly Ser Phe Lys Asn Gln Thr Phe
            260                 265                 270

Leu Ile Ser Ile Tyr Gln Val Leu Gln Glu His Gln His Arg Asp Ser
        275                 280                 285

Asp Leu Phe Leu Leu Asp Thr Arg Val Val Trp Ala Ser Glu Glu Gly
    290                 295                 300

Trp Leu Glu Phe Asp Ile Thr Ala Thr Ser Asn Leu Trp Val Val Thr
305                 310                 315                 320

Pro Gln His Asn Met Gly Leu Gln Leu Ser Val Val Thr Arg Asp Gly
                325                 330                 335

Val His Val His Pro Arg Ala Ala Gly Leu Val Gly Arg Asp Gly Pro
            340                 345                 350

Tyr Asp Lys Gln Pro Phe Met Val Ala Phe Phe Lys Val Ser Glu Val
        355                 360                 365

His Val Arg Thr Thr Arg Ser Ala Ser Ser Arg Arg Arg Gln Gln Ser
    370                 375                 380

Arg Asn Arg Ser Thr Gln Ser Gln Asp Val Ala Arg Val Ser Ser Ala
385                 390                 395                 400
```

```
Ser Asp Tyr Asn Ser Ser Glu Leu Lys Thr Ala Cys Arg Lys His Glu
                405                 410                 415

Leu Tyr Val Ser Phe Gln Asp Leu Gly Trp Gln Asp Trp Ile Ile Ala
            420                 425                 430

Pro Lys Gly Tyr Ala Ala Asn Tyr Cys Asp Gly Glu Cys Ser Phe Pro
        435                 440                 445

Leu Asn Ala His Met Asn Ala Thr Asn His Ala Ile Val Gln Thr Leu
    450                 455                 460

Val His Leu Met Asn Pro Glu Tyr Val Pro Lys Pro Cys Cys Ala Pro
465                 470                 475                 480

Thr Lys Leu Asn Ala Ile Ser Val Leu Tyr Phe Asp Asp Asn Ser Asn
                485                 490                 495

Val Ile Leu Lys Lys Tyr Arg Asn Met Val Val Arg Ala Cys Gly Cys
            500                 505                 510

His
```

<210> 17
<211> 1822
<212> DNA
<213> Homo sapiens

<400> 17

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tcactgcgag ctgcggcgcc gcacagcttc gtggcgctct gggcacccct gttcctgctg    120

cgctccgccc tggccgactt cagcctggac aacgaggtgc actcgagctt catccaccgg    180

cgcctccgca gccaggagcg gcgggagatg cagcgcgaga tcctctccat tttgggcttg    240

ccccaccgcc cgcgcccgca cctccagggc aagcacaact cggcacccat gttcatgctg    300

gacctgtaca acgccatggc ggtggaggag ggcggcgggc ccggcggcca gggcttctcc    360

taccctaca aggccgtctt cagtacccag ggccccctc tggccagcct gcaagatagc     420

catttcctca ccgacgccga catggtcatg agcttcgtca acctcgtgga acatgacaag    480

gaattcttcc acccacgcta ccaccatcga gagttccggt ttgatctttc caagatccca    540

gaaggggaag ctgtcacggc agccgaattc cggatctaca aggactacat ccgggaacgc    600

ttcgacaatg agacgttccg gatcagcgtt tatcaggtgc tccaggagca cttgggcagg    660
```

gaatcggatc tcttcctgct cgacagccgt accctctggg cctcggagga gggctggctg 720

gtgtttgaca tcacagccac cagcaaccac tgggtggtca atccgcggca caacctgggc 780

ctgcagctct cggtggagac gctggatggg cagagcatca accccaagtt ggcgggcctg 840

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gaggtccact tccgcagcat ccggtccacg gggagcaaac agcgcagcca gaaccgctcc 960

aagacgccca agaaccagga agccctgcgg atggccaacg tggcagagaa cagcagcagc 1020

gaccagaggc aggcctgtaa gaagcacgag ctgtatgtca gcttccgaga cctgggctgg 1080

caggactgga tcatcgcgcc tgaaggctac gccgcctact actgtgaggg ggagtgtgcc 1140

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ttcatcaacc cggaaacggt gcccaagccc tgctgtgcgc ccacgcagct caatgccatc 1260

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gtccgggcct gtggctgcca ctagctcctc cgagaattca gacccttttgg ggccaagttt 1380

ttctggatcc tccattgctc gccttggcca ggaaccagca gaccaactgc cttttgtgag 1440

accttccccc ccctatcccc aactttaaag gtgtgagagt attaggaaac atgagcagca 1500

tatggctttt gatcagtttt tcagtggcag catccaatga acaagatcct acaagctgtg 1560

caggcaaaac ctagcaggaa aaaaaaacaa cgcataaaga aaaatggccg ggccaggtca 1620

ttggctggga agtctcagcc atgcacggac tcgtttccag aggtaattat gagcgcctac 1680

cagccaggcc acccagccgt gggaggaagg gggcgtggca aggggtgggc acattggtgt 1740

ctgtgcgaaa ggaaaattga cccggaagtt cctgtaataa atgtcacaat aaaacgaatg 1800

aatgaaaaaa aaaaaaaaaa aa 1822

<210> 18
<211> 1873
<212> DNA
<213> Mus musculus

<400> 18
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gcgcgctgcg gcgccacaca gcttcgtggc gctctgggcg cctctgttct tgctgcgctc 180

cgccctggcc gatttcagcc tggacaacga ggtgcactcc agcttcatcc accggcgcct 240

ccgcagccag gagcggcggg agatgcagcg ggagatcctg tccatcttag ggttgcccca 300

tcgcccgcgc ccgcacctcc agggaaagca taattcggcg cccatgttca tgttggacct 360

gtacaacgcc atggcggtgg aggagagcgg gccggacgga cagggcttct cctaccccta 420

caaggccgtc ttcagtaccc agggcccccc tttagccagc ctgcaggaca gccatttcct 480

cactgacgcc gacatggtca tgagcttcgt caacctagtg gaacatgaca aagaattctt 540

ccaccctcga taccaccatc gggagttccg gtttgatctt tccaagatcc ccgagggcga 600

acgggtgacc gcagccgaat tcaggatcta taaggactac atccgggagc gatttgacaa 660

cgagaccttc cagatcacag tctatcaggt gctccaggag cactcaggca gggagtcgga 720

cctcttcttg ctggacagcc gcaccatctg ggcttctgag gagggctggt tggtgtttga 780

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ctctgtggag accctggatg ggcagagcat caaccccaag ttggcaggcc tgattggacg 900

gcatggaccc cagaacaagc aacccttcat ggtggccttc ttcaaggcca cggaagtcca 960

tctccgtagt atccggtcca cgggggggcaa gcagcgcagc cagaatcgct ccaagacgcc 1020

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gatcattgca cctgaaggct atgctgccta ctactgtgag ggagagtgcg ccttccctct 1200

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cctctcctga gccttccctc acctcccaac cggaagcatg taagggttcc agaaacctga 1560

gcgtgcagca gctgatgagc gccctttcct tctggcacgt gacggacaag atcctaccag 1620

ctaccacagc aaacgcctaa gagcaggaaa aatgtctgcc aggaaagtgt ccagtgtcca 1680

catggcccct ggcgctctga gtctttgagg agtaatcgca agcctcgttc agctgcagca 1740

gaaggaaggg cttagccagg gtgggcgctg gcgtctgtgt tgaagggaaa ccaagcagaa 1800

gccactgtaa tgatatgtca caataaaacc catgaatgaa aaaaaaaaaa aaaaaaaaaa 1860

aaaaaaagaa ttc 1873

<210> 19
<211> 430
<212> PRT
<213> Mus musculus

<400> 19

```
Met His Val Arg Ser Leu Arg Ala Ala Ala Pro His Ser Phe Val Ala
1               5                  10                  15

Leu Trp Ala Pro Leu Phe Leu Leu Arg Ser Ala Leu Ala Asp Phe Ser
            20                  25                  30

Leu Asp Asn Glu Val His Ser Ser Phe Ile His Arg Arg Leu Arg Ser
        35                  40                  45

Gln Glu Arg Arg Glu Met Gln Arg Glu Ile Leu Ser Ile Leu Gly Leu
    50                  55                  60

Pro His Arg Pro Arg Pro His Leu Gln Gly Lys His Asn Ser Ala Pro
65                  70                  75                  80

Met Phe Met Leu Asp Leu Tyr Asn Ala Met Ala Val Glu Glu Ser Gly
                85                  90                  95

Pro Asp Gly Gln Gly Phe Ser Tyr Pro Tyr Lys Ala Val Phe Ser Thr
            100                 105                 110

Gln Gly Pro Pro Leu Ala Ser Leu Gln Asp Ser His Phe Leu Thr Asp
        115                 120                 125

Ala Asp Met Val Met Ser Phe Val Asn Leu Val Glu His Asp Lys Glu
    130                 135                 140

Phe Phe His Pro Arg Tyr His His Arg Glu Phe Arg Phe Asp Leu Ser
145                 150                 155                 160

Lys Ile Pro Glu Gly Glu Arg Val Thr Ala Ala Glu Phe Arg Ile Tyr
                165                 170                 175

Lys Asp Tyr Ile Arg Glu Arg Phe Asp Asn Glu Thr Phe Gln Ile Thr
            180                 185                 190

Val Tyr Gln Val Leu Gln Glu His Ser Gly Arg Glu Ser Asp Leu Phe
        195                 200                 205

Leu Leu Asp Ser Arg Thr Ile Trp Ala Ser Glu Glu Gly Trp Leu Val
    210                 215                 220

Phe Asp Ile Thr Ala Thr Ser Asn His Trp Val Val Asn Pro Arg His
225                 230                 235                 240
```

```
Asn Leu Gly Leu Gln Leu Ser Val Glu Thr Leu Asp Gly Gln Ser Ile
                245                 250                 255

Asn Pro Lys Leu Ala Gly Leu Ile Gly Arg His Gly Pro Gln Asn Lys
            260                 265                 270

Gln Pro Phe Met Val Ala Phe Phe Lys Ala Thr Glu Val His Leu Arg
        275                 280                 285

Ser Ile Arg Ser Thr Gly Gly Lys Gln Arg Ser Gln Asn Arg Ser Lys
    290                 295                 300

Thr Pro Lys Asn Gln Glu Ala Leu Arg Met Ala Ser Val Ala Glu Asn
305                 310                 315                 320

Ser Ser Ser Asp Gln Arg Gln Ala Cys Lys Lys His Glu Leu Tyr Val
                325                 330                 335

Ser Phe Arg Asp Leu Gly Trp Gln Asp Trp Ile Ile Ala Pro Glu Gly
            340                 345                 350

Tyr Ala Ala Tyr Tyr Cys Glu Gly Glu Cys Ala Phe Pro Leu Asn Ser
        355                 360                 365

Tyr Met Asn Ala Thr Asn His Ala Ile Val Gln Thr Leu Val His Phe
    370                 375                 380

Ile Asn Pro Asp Thr Val Pro Lys Pro Cys Cys Ala Pro Thr Gln Leu
385                 390                 395                 400

Asn Ala Ile Ser Val Leu Tyr Phe Asp Asp Ser Ser Asn Val Ile Leu
                405                 410                 415

Lys Lys Tyr Arg Asn Met Val Val Arg Ala Cys Gly Cys His
            420                 425                 430
```

<210> 20
<211> 1723
<212> DNA
<213> Homo sapiens

<400> 20
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ccacaccgca ccaagcggtg gctgcaggag ctcgcccatc gcccctgcgc tgctcggacc 180

gcggccacag ccggactggc gggtacggcg gcgacagagg cattggccga gagtcccagt 240

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gacaggtgtc gcgcggcggg gctccaggga ccgcgcctga ggccggctgc ccgcccgtcc 360

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aggccctggg tcggccgcgg agccgatgcg cgcccgctga gcgccccagc tgagcgcccc 480

cggcctgcca tgaccgcgct ccccggcccg ctctggctcc tgggcctggc gctatgcgcg 540

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cgcctgggcc gcgccgacct ggtcatgagc ttcgttaaca tggtggagcg agaccgtgcc 840

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gcctgcggct gccactgagt cagcccgccc agccctactg cag 1723

<210> 21
<211> 402
<212> PRT
<213> Homo sapiens

<400> 21

```
Met Thr Ala Leu Pro Gly Pro Leu Trp Leu Leu Gly Leu Ala Leu Cys
1               5                  10                  15

Ala Leu Gly Gly Gly Gly Pro Gly Leu Arg Pro Pro Pro Gly Cys Pro
            20                  25                  30

Gln Arg Arg Leu Gly Ala Arg Glu Arg Arg Asp Val Gln Arg Glu Ile
        35                  40                  45

Leu Ala Val Leu Gly Leu Pro Gly Arg Pro Arg Pro Arg Ala Pro Pro
    50                  55                  60

Ala Ala Ser Arg Leu Pro Ala Ser Ala Pro Leu Phe Met Leu Asp Leu
65                  70                  75                  80

Tyr His Ala Met Ala Gly Asp Asp Asp Glu Asp Gly Ala Pro Ala Glu
                85                  90                  95

Arg Arg Leu Gly Arg Ala Asp Leu Val Met Ser Phe Val Asn Met Val
            100                 105                 110

Glu Arg Asp Arg Ala Leu Gly His Gln Glu Pro His Trp Lys Glu Phe
        115                 120                 125

Arg Phe Asp Leu Thr Gln Ile Pro Ala Gly Glu Ala Val Thr Ala Ala
    130                 135                 140

Glu Phe Arg Ile Tyr Lys Val Pro Ser Ile His Leu Leu Asn Arg Thr
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Leu His Val Ser Met Phe Gln Val Val Gln Glu Gln Ser Asn Arg Glu
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Ser Asp Leu Phe Phe Leu Asp Leu Gln Thr Leu Arg Ala Gly Asp Glu
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Gly Trp Leu Val Leu Asp Val Thr Ala Ala Ser Asp Cys Trp Leu Leu
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Ser Pro Ile Arg Thr Pro Arg Ala Val Arg Pro Leu Arg Arg Arg Gln
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Pro Lys Lys Ser Asn Glu Leu Pro Gln Ala Asn Arg Leu Pro Gly Ile
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Phe Asp Asp Val His Gly Ser His Gly Arg Gln Val Cys Arg Arg His
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Glu Leu Tyr Val Ser Phe Gln Asp Leu Gly Trp Leu Asp Trp Val Ile
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Ala Pro Gln Gly Tyr Ser Ala Tyr Tyr Cys Glu Gly Glu Cys Ser Phe
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Pro Leu Asp Ser Cys Met Asn Ala Thr Asn His Ala Ile Leu Gln Ser
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Leu Val His Leu Met Lys Pro Asn Ala Val Pro Lys Ala Cys Cys Ala
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Pro Thr Lys Leu Ser Ala Thr Ser Val Leu Tyr Tyr Asp Ser Ser Asn
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Ala Ala Arg Gln Pro Ala Ser Ala Pro Leu Phe Met Leu Asp Leu Tyr
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His Ala Met Thr Asp Asp Asp Asp Gly Gly Pro Pro Gln Ala His Leu
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Gly Arg Ala Asp Leu Val Met Ser Phe Val Asn Met Val Glu Arg Asp
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Arg Thr Leu Gly Tyr Gln Glu Pro His Trp Lys Glu Phe His Phe Asp
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Leu Thr Gln Ile Pro Ala Gly Glu Ala Val Thr Ala Ala Glu Phe Arg
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Ile Tyr Lys Glu Pro Ser Thr His Pro Leu Asn Thr Thr Leu His Ile
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Ser Met Phe Glu Val Val Gln Glu His Ser Asn Arg Glu Ser Asp Leu
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Phe Phe Leu Asp Leu Gln Thr Leu Arg Ser Gly Asp Glu Gly Trp Leu
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Val Leu Asp Ile Thr Ala Ala Ser Asp Arg Trp Leu Leu Asn His His
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Thr Asn Glu Leu Pro His Pro Asn Lys Leu Pro Gly Ile Phe Asp Asp
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Gly His Gly Ser Arg Gly Arg Glu Val Cys Arg Arg His Glu Leu Tyr
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Val Ser Phe Arg Asp Leu Gly Trp Leu Asp Trp Val Ile Ala Pro Gln
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Xaa Cys Xaa Xaa Pro Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Asn His Ala
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Xaa Cys Cys Xaa Pro Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Leu Xaa Xaa
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20 25 30

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
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Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Cys Xaa Pro
50 55 60

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Leu Xaa Xaa Xaa Xaa Xaa Xaa Xaa
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<222> (84)..(84)
<223> Xaa is (Ser, Asn, Glu, Asp, Val, Lys, Gly, Gln or Arg)

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<223> Xaa is (Asn, Lys, Thr, Pro, Val, Ile, Arg, Ser or Gln)

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<223> Xaa is (Val, Ile, Thr or Ala)

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<222> (87)..(87)
<223> Xaa is (Ile, Asn, Val, Leu, Tyr, Asp or Ala)

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<223> Xaa is (Leu, Tyr, Lys, or Ile)

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<223> Xaa is (Lys, Arg, Asn, Tyr, Phe, Thr, Glu or Gly)

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<223> Xaa is (Lys, Arg, His, Gln, Asn, Glu or Val)

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<223> Xaa is (Tyr, His, Glu or Ile)

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<223> Xaa is (Arg, Glu, Gln, Pro or Lys)

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<223> Xaa is (Asn, Asp, Ala, Glu, Gly or Lys)

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<223> Xaa is (Met or Ala)

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<223> Xaa is (Gly, Ala or Thr)

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<223> Xaa is (His, Arg, Gly, Leu or Ser)

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Cys Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
1 5 10 15

Xaa Xaa Xaa Xaa Xaa Pro Xaa Xaa Xaa Xaa Xaa Xaa Xaa Cys Xaa Gly
20 25 30

Xaa Cys Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
50 55 60

Xaa Xaa Cys Xaa Pro Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Leu Xaa Xaa
65 70 75 80

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
85 90 95

Xaa Xaa Cys Xaa Cys Xaa
100

<210> 29
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<213> Artificial Sequence

<220>
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<223> Xaa at res. 3 is (Lys or Arg)

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<223> Xaa at res. 11 is (Arg or Gln)

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<223> Xaa at res. 16 is (Gln or Leu)

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<223> Xaa at res. 26 is (Ala or Ser)

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<223> Xaa at res. 35 is (Ala or Ser)

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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa at res. 41 is (Tyr or Cys)

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<223> Xaa at res. 50 is (Val or Leu)

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<223> Xaa at res. 52 is (Ser or Thr)

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<223> Xaa at res. 56 is (Phe or Leu)

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<223> Xaa at res. 57 is (Ile or Met)

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<223> Xaa at res. 58 is (Asn or Lys)

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<223> Xaa at res. 60 is (Glu, Asp or Asn)

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<223> Xaa at res. 61 is (Thr, Ala or Val)

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<223> Xaa at res. 65 is (Pro or Ala)

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<223> Xaa at res. 71 is (Gln or Lys)

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<223> Xaa at res. 73 is (Asn or Ser)

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<223> Xaa at res. 75 is (Ile or Thr)

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<223> Xaa at res. 80 is (Phe or Tyr)

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<223> Xaa at res. 82 is (Asp or Ser)

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<223> Xaa at res. 84 is (Ser or Asn)

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<222> (89)..(89)
<223> Xaa at res. 89 is (Lys or Arg)

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<223> Xaa at res. 91 is (Tyr or His)

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<220>
<221> VARIANT
<222> (97)..(97)
<223> Xaa at res. 97 is (Arg or Lys)

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Cys Xaa Xaa His Glu Leu Tyr Val Ser Phe Xaa Asp Leu Gly Trp Xaa
1 5 10 15

Asp Trp Xaa Ile Ala Pro Xaa Gly Tyr Xaa Ala Tyr Tyr Cys Glu Gly
20 25 30

Glu Cys Xaa Phe Pro Leu Xaa Ser Xaa Met Asn Ala Thr Asn His Ala
35 40 45

Ile Xaa Gln Xaa Leu Val His Xaa Xaa Xaa Pro Xaa Xaa Val Pro Lys
50 55 60

Xaa Cys Cys Ala Pro Thr Xaa Leu Xaa Ala Xaa Ser Val Leu Tyr Xaa
65 70 75 80

Asp Xaa Ser Xaa Asn Val Ile Leu Xaa Lys Lys Arg Asn Met Val Xaa
85 90 95

Ala Cys Gly Cys His
100

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<223> proteolytic site of morphogenic proteins from multiple species

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Arg Xaa Xaa Arg
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<210> 31
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<213> Homo sapiens

<400> 31

Gly Gly Pro Pro
1